

## AMENDMENTS TO THE CLAIMS

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- Claim 1 (Currently amended) An extrusion-free wet cleaning process for post-etch Cu-dual damascene structures, the process comprising:
- 5 providing a wafer comprising a silicon substrate and at least one post-etch Cu-dual damascene structure, the post-etch Cu-dual damascene structure having a via structure exposing a portion of a Cu wiring line electrically connected with an N<sup>+</sup> diffusion region of the silicon substrate and a trench structure formed on the via structure;
- 10 ~~executing an oxidation step by applying a diluted H<sub>2</sub>O<sub>2</sub> solution to the wafer to slightly oxidize the surface of the exposed Cu wiring line; and~~
- 15 ~~washing away cupric oxide generated in the oxidation step by means of a cupric oxide cleaning solution containing diluted HF, NH<sub>4</sub>F or NH<sub>2</sub>OH having a pH of above 7.5 and~~
- ~~20 preventing Cu reduction reactions on the N<sup>+</sup>-diffusion region connected Cu wiring line.~~
- Claim 2 (Original) The process of claim 1 wherein the Cu wiring line electrically connected with an N<sup>+</sup> diffusion region of the silicon substrate serves as a cathode in the cupric oxide cleaning solution.
- 25 Claim 3 (Original) The process of claim 1 wherein the method of preventing Cu reduction reactions on the Cu wiring line comprises purging inert gas onto the wafer during the application to the wafer of the diluted H<sub>2</sub>O<sub>2</sub> solution.
- 30 Claim 4 (Original) The process of claim 1 wherein the method of preventing Cu reduction reactions on the Cu wiring line comprises adding a Cu corrosion inhibitor to the diluted H<sub>2</sub>O<sub>2</sub> solution.
- Claim 5 (Original) The process of claim 4 wherein the Cu corrosion inhibitor comprises benzotriazole (BTA).
- 35 Claim 6 (Currently amended) The process of claim 1 wherein the method of preventing Cu reduction reactions on the Cu wiring line comprises reducing the H<sub>2</sub>O<sub>2</sub> concentration of the diluted H<sub>2</sub>O<sub>2</sub> solution to below 100:1 (v/v) of solvent to H<sub>2</sub>O<sub>2</sub>.
- 40 Claim 7 (Original) The process of claim 1 wherein the method of preventing Cu reduction reactions on the Cu wiring line comprises lowering the temperature of the diluted H<sub>2</sub>O<sub>2</sub> solution to below 15°C during the application to the wafer of the diluted H<sub>2</sub>O<sub>2</sub> solution.
- Claim 8 (Cancelled)

- 5      Claim 9 (Currently amended) A wet cleaning process comprising:  
       an oxidation step comprising a means for reducing Cu deposition on a cathode-like copper wiring line of a Cu-dual damascene structure, wherein the means for reducing Cu deposition on a cathode-like copper wiring line comprises a step of purging an inert gas during the oxidation process; and  
       an oxide etch step for washing away cupric oxide generated in the oxidation step by means of a cupric oxide cleaning solution; and  
       reducing Cu deposition on a cathode-like copper wiring line of a Cu-dual damascene structure.
- 10     Claim 10 (Original) The process of claim 9 wherein the oxidation step is used to slightly oxidize a surface of a Cu wiring line in a dual damascene structure by utilizing a diluted H<sub>2</sub>O<sub>2</sub> solution.
- 15     Claim 11 (Original) The process of claim 9 wherein the cupric oxide cleaning solution comprises diluted HF, NH<sub>4</sub>F, NH<sub>2</sub>OH, or diluted HF/HCl.
- 20     Claim 12 (Original) The process of claim 9 wherein the oxide generated in the oxidation step comprises CuO<sub>x</sub> and Cu(OH)<sub>2</sub>.
- 25     Claim 13 (Original) The process of claim 9 wherein the cathode-like copper wiring line is electrically connected with an N<sup>+</sup> diffusion region of a silicon substrate.
- 30     Claim 14 (Cancelled)
- 35     Claim 15 (Original) The process of claim 9 wherein the process of reducing Cu deposition on a cathode-like copper wiring line comprises adding a Cu corrosion inhibitor to the diluted H<sub>2</sub>O<sub>2</sub> solution.
- 40     Claim 16 (Original) The process of claim 15 wherein the Cu corrosion inhibitor comprises benzotriazole (BTA).
- 45     Claim 17 (Currently amended) The process of claim 9 wherein the process of reducing Cu deposition on a cathode-like copper wiring line comprises reducing the H<sub>2</sub>O<sub>2</sub> concentration of the diluted H<sub>2</sub>O<sub>2</sub> solution to below 100:1 (v/v) of solvent to H<sub>2</sub>O<sub>2</sub>.

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35     Claim 18 (Original) The process of claim 9 wherein the process of reducing Cu deposition on a cathode-like copper wiring line comprises lowering the temperature of the diluted H<sub>2</sub>O<sub>2</sub> solution during the oxidation step to below 15°C.

40     Claim 19 (Original) The process of claim 9 wherein the process of reducing Cu deposition on a cathode-like copper wiring line comprises increasing the pH of the cupric oxide cleaning solution to above 7.

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